

ANNUAL WATER QUALITY REPORT

Water Year 2000



Victor M Chan, PE
Water Quality Engineer
U. S. Army Corps of Engineers
Sacramento District

31 January 2001

I. Introduction

A. Requirements - This report follows the requirements of Engineering Regulation 1110-2-8154, entitled "Water Quality and Environmental Management for Corps Civil Works Projects". This regulation requires a summary of the water quality management programs for the past fiscal year, and requires the following items be addressed in this report:

- (1) Describe the goals and objectives of the water quality management program.
- (2) Progress made toward meeting these goals and objectives.
- (3) Activities that are planned for the out years.
- (4) Changes in technical capabilities in the district office.
- (5) Relationship between water quality and water control management activities.
- (6) Pertinent division regulations.
- (7) Laboratory facilities.
- (8) Data management system.
- (9) Training obtained.
- (10) Training needs.
- (11) A discussion of research and development needs.
- (12) Special studies completed or required.
- (13) Water quality coordination with other agencies.
- (14) Scheduling for detailed project evaluations.
- (15) Problems encountered with contracted work.
- (16) Special assistance from other Corps elements or research facilities.
- (17) A project-by-project summary of water quality conditions.
- (18) Problems encountered and how addressed at each project.
- (19) Opportunities identified and how addressed.
- (20) Innovative techniques utilized to improve water quality.
- (21) Action Items for the Lake Monitoring Report.

B. Goals and Objectives – The goals and objectives of the water quality management program are to ensure that the US Army Corps of Engineer's projects in the planning, design, construction, and operation phases do not degrade water quality, so that the beneficial uses of the water can be achieved. This is achieved by having a water quality engineer participating in the Civil Works Process beginning with the Reconnaissance phase all the way to the Construction & Operation phase. Critical involvement is in the middle phases when the feasibility studies and engineering work are being accomplished. A water quality engineer ensures that the Civil Work Process includes the application of monitoring programs, Best Management Practices, the utilization of analytical techniques, mathematical models, and the installation of mitigation devices where needed.

For the existing 12 lakes in the annual lake monitoring program, the goals have been to establish baseline water quality conditions, to measure any trends from the baseline conditions, and to ensure that the lakes are protected against the entrance of undesirable nutrient and toxic loads. This will ensure that the water quality remains satisfactory to support the beneficial uses assigned to the lake and the downstream water.

C. Progress Made Toward Meeting The Goals and Objectives - During the project's planning stage, a water quality engineer is usually involved in negotiating or reviewing the regulatory requirements such as the Water Quality Certification and Waste Discharge Requirements (WDR) issued by the Regional Water Quality Control Board. If the regulatory requirements have already been established, the water quality engineer would issue a written report evaluating the requirements and make recommendations to the Project Manager on specific steps necessary to ensure compliance. Some of these recommendations may include environmental engineering to ensure water quality. For example, the Napa River Flood

Control Project is a project which required the water quality engineer to issue three engineering reports: (1) An Assessment Report of the Waste Discharge Requirements, (2) An Environmental Engineering Report on the use of Turbidity Curtains, and (3) A Report on the Recommended Best Management Practices to be deployed to prevent Storm Water Pollution. Other projects may involve Water Quality monitoring programs during actual construction near or within a protected body of water. The Water Quality Engineer reviews the Water Quality data before being forwarded to the applicable regulatory agencies for proof of compliance. The water quality engineer resolves any non-compliance issue and this knowledge are applied on future projects in the planning phase to prevent a non-compliance problem from reoccurring.

For the Lake Monitoring Program, the baseline data has been established so this program is progressing to address more site specific problems such as MTBE and mercury that have been found on certain lakes. For the Maintenance Dredging Program, the water quality data, the sediment data and bioassay data have been collected over the years to meet both the regulatory and scientific requirements.

D. Activities Planned For The Out-years - All of the current programs are expected to continue. Current planning for the existing annual lake water quality monitoring program is to start tailoring the program to address site-specific conditions. More monitoring may be performed on lakes that are experiencing problems while other lakes with no apparent problems will have a reduced monitoring program. The Lake monitoring Program is now focusing on the fuel oxygenate, MTBE, and the potential bioaccumulation of methyl mercury in fish tissue. The data collected from the Sacramento Deep Water Ship Channel salinity monitoring program is in the process for being summarized and archived so that it is available for comparison to post-deepening data. The jet aerators in the Stockton Deep Water Ship Channel are expected to

continue to be utilized during the Fall salmon run. Sediment data in the Sacramento and San Joaquin Deep Ship Channel are being monitored to determine if there is any correlation between contaminant levels and hydrological data. Preliminary indications seem to imply that a hydrological wet or normal year should result in low contaminant levels while a hydrological dry year may result in elevated contaminant levels in the following normal or wet year. If this correlation is confirmed, this will improve the planning process for maintenance dredging.

E. Changes In Technical Capabilities In The District Office - Technical capabilities continue to grow. District knowledge is expanding on ecosystem restoration and methyl-mercury issues due to project experience and training. The Internet is now becoming an important source of new information on water quality issues. The uploading of this Annual Water Quality Report on Sacramento District's WebPages also allows the sharing of water quality information. Several government agencies and private citizens were directed to access these WebPages and were impressed by the availability of water quality data. The Sacramento District web page is located at <http://www.spk.usace.army.mil/cespk-ed/env/>. Planning is now underway to upload sediment data from the Sacramento District's maintenance dredging projects in 2001.

F. Relationship Between Water Quality And Water Control Management Activities - The Water Quality activity is located within Environmental Engineering Branch, while the Water Control Management activity is located within Civil Design Branch. Personnel within the Water Quality activity are also involved in hazardous and toxic waste cleanup activities for DOD, EPA, and other federal agencies. Other Water Quality activity involvement includes drinking water and wastewater treatment activities, in acid mine cleanup, and in Brownfield support. There is only

occasional contact between the two activities as regards the Annual Lake Water Report. The Water Control Management activity writes a service contract for the U.S. Bureau of Reclamation to collect the water quality samples at the 12 Corps of Engineer's Lakes. The Water Quality activity writes the contract specifications to the chemistry and biological laboratories, analyze the laboratory results, and then writes this report.

G. Pertinent Division Regulations - There are no pertinent South Pacific Division Regulations at this time. However, there are discussions on developing a standard procedure in 2001 to address Stormwater Pollution Prevention on Civil Works Projects. A recent Notice of Violation, issued by the EPA Region 9 against Sacramento District, is the driving force to develop this written procedure. This procedure will describe the District's procedure to submit the NOI for coverage under the General Permit, describes how to implement the Best Management Practices to prevent soil erosion and sedimentation into a protected body of water, and describes who will be responsible for issuing the SWPPP (Storm Water Pollution Prevention Plan). Issuing this written procedure will provide assurances to the US EPA and the state water board that a similar Notice of Violation will not reoccur. The District's water quality engineer is expected to make major contributions in the development of this written procedure.

H. Laboratory Facilities - Private commercial laboratories are utilized to perform the analyses. The chemistry laboratory selected has to be certified by the California Department of Health Services in the parameters being analyzed and must provide QA/QC data with their reports. For the biological analyses (phytoplankton), an algologist at the University of California at Davis does the analyses.

I. Data Management System - The District does not have a data management system at this time. Data is currently stored in binders or uploaded on the District's homepage. The District is hopeful that it can start utilizing the EPA's national data storage and retrieval (STORET) system in the near future and is currently waiting funding for STORET training. District personnel will be contacting the in-house GIS personnel to determine how to store the lake water quality data and the dredging water quality and sediment quality data so that it is accessible for display and analysis applications. The data will be inter-related to maps that can be called up on the PC screen. It is assumed that Arc View will be the GIS program applied. The storage of data in electronic files compatible with GIS application is under consideration, so that this data can be plotted onto maps in various bar charts, pie charts, and X-Y diagrams. This will enhance the analysis of data.

J. Training Obtained -

- (1) Civil Engineering Professional Engineer's Review Class at UC Berkeley - This class was taken by the Water Quality Engineer to obtain a second PE license to become a double PE in both Mechanical and Civil Engineering. This training provides diversity in expertise.
- (2) Construction Site Planning and Management for Water Quality Protection – This class was taken by the Water Quality Engineer to address Stormwater Pollution Protection.
- (3) Ross Island's tour of a dredging barge – This tour provides familization with dredging equipment.

K. Training Needs - The District personnel are obtaining the training needed. Training in the environmental effects of dredging, water quality mathematical modeling of rivers

and lakes, chemistry procedures, and others are available and funding is provided by either project funds (with project manager's approval) or overhead funds (with branch head's approval). The suggested training for District water quality personnel for the next 24 months is as follows:

- Total Maximum Daily Load (TMDL) Program – This program is identifying those water bodies which are impaired in achieving their beneficial water quality uses, and in determining how to reduce the wastes generated in the watersheds of those water bodies.
- California Toxics Rule (CTR) - On May 18, 2000, the U.S. EPA set numerical criteria for priority toxic pollutants for the State of California. The criteria appear in 40CFR Part 131, and are referred to as the California Toxics Rule. Aquatic life criteria are set for 23 pollutants, and human health criteria are set for 57 pollutants. These are the priority pollutant criteria against which District projects will be compared.
- State Implementation Policy for Permits – This procedure will be used to determine the mixing zones and dilution credits allowed for projects that discharge effluents into receiving waters.
- Determination of Mixing Zones and Dilution Credits in Rivers, Lakes, and Estuaries – This will become important for District discharges of dredging and construction effluents back in to rivers.
- The EPA “Rules” on Domestic Water Treatment – There are about 10 “Rules” now that have direct application to Civil Works and Military Base water treatment plants. These cover such things as Disinfection By-Products and Wellhead Protection.
- Toxicity Reduction Evaluations and Plans – These topics will become important for dredging projects and construction projects along waterways.
- Acute and chronic bioassays procedures and interpretations – The bioassay procedures are becoming more important in supplementing the chemical testing that is done to determine project effects upon water quality.
- STORET – Obtaining ambient water quality data from STORET will be important in utilizing the State Implementation Policy and California Toxic Rule in determine allowable effluent quality from dredge and construction projects.
- Wetlands design – These are increasing in importance in mitigating for the effects of contaminated water entering a water body. These will be important features for utilization at such areas as Lake Tahoe and Clear Lake.

L. Research and Development Needs - The District needs to develop its water quality Field Sampling Plan and its Quality Assurance Project Plan for the annual lake water quality

monitoring program. A funding proposal to develop the FSP and QAPP was submitted to Construction Operations Division but O&M funding requests involve a 2-year lead-time. Therefore, the Field Sampling Plan and QA Project Plan are not expected to be funded and developed until 2002. It should be noted that all of the color data graphs in the Lake Monitoring report had to be converted from Quattro-Pro into Excel. This labor-intensive effort was successfully completed in 2000 and therefore the FSP and QAPP had to be deferred since there was insufficient resources and funding to complete the FSP and QAPP in 2000.

M. Special Studies Completed or Required - The District also added the gasoline oxygenate MTBE (methyl tertiary butyl ethylene) to its annual lake monitoring program, as this recently has caused some local concern at one of the lakes. The concern is that jet skies may be putting this substance into the lakes in quantities that may affect the fish and the people who consume the fish. MTBE monitoring will continue and may even expand on some of the Lakes, which have a higher concentration relative to the other Lakes. MTBE is a member of a group of chemicals commonly known as fuel oxygenates. Oxygenates are added to gasoline fuel to increase its oxygen content throughout the U.S. to reduce carbon monoxide and ozone levels caused by auto emissions. MTBE replaced the use of lead as an octane enhancer since 1979. MTBE is a recalcitrant highly mobile compound that is not easily degradable in the environment and it is receiving intense regulatory scrutiny at this time. In order to develop base conditions and long-term trends on MTBE at the District's Lakes, the District is focusing on MTBE in 2001 and this effort will continue to expand in the future. The initial MTBE results for 2000 are published in the Individual Lake's reports and it should be noted that it is too early to determine any long-term trends.

Due to mercury levels exceeding the EPA's action level of 0.012 ppm in the water at the

bottom of the lakes, a fish tissue analysis program was initiated in Sep 2000. Lab results of the 2000 fish tissue program resulted in total mercury levels below the FDA's level of 1 ppm for a fish advisory. However, some of the lakes had fish tissue, which exceeded the EPA's action level of 0.3 ppm, and therefore this program is expected to expand in future years.

The Calif. Office of Environmental Health Hazard Assessment (OEHHA) had conducted a more extensive sampling program and a study to assess the likelihood and degree of exposure to chemical contaminants in fish from Black Butte Lake. The OEHHA and U.S. EPA jointly selected the sites and fish species to be sampled and the chemicals to be analyzed in the fish tissue. In all, the sampling program analyzed for four metals and 35 organic compounds, which included PCB's and dioxins/furans. The health evaluation found that persons consuming largemouth bass or channel catfish from Black Butte Lake are potentially exposed to levels of methyl mercury above the reference level set by the U.S. EPA. Based on the above, OEHHA in a March 2000 report recommends the following consumption guidelines for fish taken from Black Butte Lake: "Due to the elevated level of mercury, pregnant women, nursing women and women who may soon become pregnant should eat no more than one meal (eight ounces) per month of largemouth bass, channel catfish, carp and crappie. Mercury is a potent neurotoxin, so children and adults should also follow the same advice".

The District's primary goal is to track long-term trends and to make recommendations to the Lake's Park Managers. The District is likely to make a similar recommendation as the OEHHA recommendation if any lake has been found to have relatively high mercury levels in fish tissue. If the mercury levels exceed the FDA criteria of 1 ppm, then a fish advisory is mandatory.

Mercury exists in the environment in a variety of chemical forms. The most important form of mercury in the aquatic environment is methyl mercury, which is readily accumulated by biota and transferred through the food web. Most of the mercury that accumulates in fish tissue is

methyl mercury. The first year's sampling in the District Lakes focused on the catfish specie but there were difficulties in collecting this specie on some lakes so therefore alternate species had to be collected. The fish tissue was analyzed for total mercury (most of which is known to be methyl mercury) and the concentrations in the fish tissue were compared to screening values developed by the U.S. EPA and the FDA. The District efforts may be useful to other studies being conducted such as the CALFED Sacramento River Mercury TMDL Study and the Clear Lake Mercury TMDL Study.

N. Water Quality Coordination With Other Agencies - The District maintained contact with the following agencies on water quality-related projects:

1. CALFED - This is a joint federal-state interagency group dedicated to preserving the environmental health of the San Francisco Bay-Delta system. The Sacramento District participates in some of the Technical Advisory Panels (TAP) involving projects in which CALFED is an active participant. Since 1995, the State of California and Federal agencies with regulatory or management responsibility in the San Francisco Bay-Delta have been working together to solve the region's problems in a balanced way that offers benefits for all interests. The Sacramento District of the Corps of Engineers is one of the Federal agencies involved. The product of this effort is the CALFED Bay-Delta Program, which is a comprehensive effort to solve the interrelated problems of the Bay-Delta. For decades, the Bay-Delta has struggled to meet the competing demands of the environment and water users while maintaining good water quality and a levee system that protects local towns and infrastructure from flooding and contaminating the State's water supply. Currently, the Bay-Delta is not adequately meeting any of these needs. Specifically, CALFED has identified four basic problem areas: ecosystem quality, water supply

reliability, water quality, and levee system integrity. These problems – and their solutions – are interrelated. Single-purpose efforts to solve problems in the past have failed to adequately address the comprehensive nature of the Bay-Delta resources and problems, and the conflicts between supply and demand. Details on the CALFED program can be found at <http://calfed.ca.gov>.

One CALFED project, that the District is participating in, is the Upper Yuba River Studies Program. The purpose of this program is to determine if introduction of wild Chinook salmon and steelhead to the Yuba River watershed is biologically, environmentally and socio-economically feasible over the long term. Some of the issues involved deal with sediment control and water quality. The District's Englebright Dam on the Yuba River and its operation are important factors in this study.

2. Bay-Delta Modeling Forum - This is an interagency group dedicated to ensuring that peer reviews are conducted on all mathematical models utilized and scientific studies done in the San Francisco Bay-Delta system. The Sacramento District is a member of the Forum.

3. National Ambient Water Quality Assessment (NAWQA) Program - The USGS has been tasked by Congress to select watersheds throughout the United States and perform rigorous analyses of water quality with the purpose of initiating a trend toward obtaining high quality data for 21st Century decisions. Three watersheds have been selected within the Sacramento District boundaries, these being the Sacramento River Basin, the San Joaquin - Tulare Basin, and the Carson River Basin. A liaison committee exists for each of these basin studies.

4. Lake Tahoe Water Quality Restoration Program - The Sacramento District is preparing to become involved in this program, with the Lahontan Regional Water Quality Control

Board as a sponsor. The District is participating along with such agencies such as the Tahoe Regional Planning Agency, the U.S. Geological Survey, the U.S. Forest Service, and the Universities of California and Nevada.

5. TMDL studies – Future coordination may occur where TMDL studies and Watershed Management Initiative studies of other agencies are being accomplished in watersheds where the District's Lakes are located. .

6. San Francisco Bay-Delta Circulation Studies - The USGS is conducting a multi-agency study of circulation within and salinity intrusion into the bays and Delta. The District has loaned the USGS its six underwater S-4 computerized data loggers in support of this study. The resulting data will be of use to all agencies involved in restoring the environmental health to the fragile ecosystem, and to those agencies such as the Corps that have projects in the area.

7. Stormwater Permits for Construction Activities- Civil Works construction projects over 5 acres are required to have a stormwater pollution prevention permit to protect water quality during a storm event. One requirement is to have a stormwater pollution prevention plan and a spill control plan in place during construction. An example of permitted projects includes the Napa River Flood Control Project, the Lower American Levee Improvement Project, and the Sacramento Riverbank Protection Project near Knights Landing. Recently, the San Francisco BayKeeper, Santa Monica BayKeeper, San Diego BayKeeper, and Orange Coast BayKeeper filed a petition for writ of mandate challenging the current General Permit provisions in the Superior Court, County of Sacramento. The Court issued a judgment and writ of mandate court order on September 15, 2000 and directed the SWRCB to modify the provisions of the General Permit to

require permittees to implement specific sampling and analytical procedures to determine whether Best Management Practices (BMPs) implemented on a construction site are effective. This new monitoring program will be invoked on all impaired bodies of waters as listed in the permit. The District is cooperating with the State Water Resource Control Board by providing written comments to the proposed new permit and providing information to the board's staff regarding field experience on a typical Civil Works project.

8. Water Quality Certification for Construction Activities – Construction projects located within the California rivers and streams are required to obtain certification from the state verifying that the activity will comply with the state's water quality standards. This state certification is a requirement of Section 401 of the Clean Water Act. The District has applied for certification on numerous projects, such as the Sacramento Bank Improvement project, but the state may issue formal letter indicating that a waiver to Section 401 water quality certification has been issued for the proposed project. This waiver indicates that the nature of the project is such that any water quality impact is insignificant and therefore water quality certification is not required. Some of the District's projects involve water quality certification waivers. In most cases, the regional water quality control board would issue a waiver but may also issue a waste discharge requirement (WDR) for the permittee to control water quality during actual construction. A WDR was issued for the Napa River Flood Control Project.

O. Scheduling For Detailed Project Evaluations - Scheduling is currently underway for the water quality work that supports maintenance dredging on the Sacramento River and Stockton River Deep Water Ship Channels.

P. Problems Encountered Contracted Work - In 2000, a NPDES notice of violation (NOV) was written by EPA Region 9 against the District's Lower American River's levee improvement project because the inspectors noticed that the Best Management Practices for stormwater pollution protection were sub-standard. The District Commander ordered that a committee be organized to determine the reasons for the NOV and provide recommendations for corrective action. The committee's goal is to activate a procedure whereby all future construction projects will meet the Permit requirements by ensuring that the Stormwater Pollution Prevention Plan (SWPPP) will include a spill control plan, identification of adequate Best Management Practices and certification of compliance. The district's water quality engineer is a member of this committee, which also consists of representatives from Planning division, PPMD, Civil Design, and Construction Operations Division. It was determined that the current NPDES process was for Sacramento District to submit the NOI to the Regional Water Quality Control Board for coverage under the General Construction NPDES permit. Civil Design would then write the contract specifications, which requires that the contractor must comply with the permit conditions. It was also noted that the Best Management Practices (BMP's) requiring the installation of tackified straw, silt fences, fabric rolls, etc were determined by the contractor. Unfortunately, the contractor would tend to cut corners in the selection of the BMPs in order to reduce costs. Since the contract specifications did not specify any explicit BMPs or any guidance document for the contractor, this current process resulted in the NOV. To avoid another NOV, the contract specifications will be upgraded in 2001 to reference the SF RWQCB's Field Manual for Erosion and Sediment Control (3rd edition, July 1999) as the BMP guidance document. In December 2000, representatives from EPA Region 9 and the Central Valley RWQCB agreed that the SF RWQCB's Field Manual is a good guidance document for the installation of BMPs for stormwater pollution protection. For some projects involving a higher risk of stormwater pollution, the BMPs may have to be specified

by the water quality engineer, rather than depending on the contractor to select the appropriate BMPs from the Field Manual. This has already occurred for the Napa River Flood Control Project, when the District's water quality engineer wrote the SWPPP (Storm Water Pollution Prevention Plan) and included the SWPPP in the contract specification.

Q. Special Assistance From Other Corps Elements Or Research Facilities - Assistance has been obtained from Waterways Experiment Station on mathematical modeling and dredging activities. The Waterway Experiment Station has also been consulted involving methyl-mercury formation in Wetlands supporting the Middle Creek Wetland Project and the Guadalupe Creek Restoration Project. The Corp's Waterway Experiment Station (WES) also reviewed the District's report entitled "Monitoring Results for the Pre-Deepened Sacramento Deep Water Ship Channel". The District's report was generated from hydrodynamic and salinity data collected over the vertical depth at three sites located longitudinally along the Ship channel. The data was collected over the period of 1987-1994, and was collected to satisfy an agreement made between the District and the California Department of Water Resources and U.S. Bureau of Reclamation. The WES made several recommendations that will be incorporated into the report at its next revision.

R. Project-By-Project Summary of Water Quality Conditions - This is described in Section II.

S. Problems Encountered And How Addressed At Each Project - It is becoming more difficult to meet the dredging water quality criteria as the regulatory agencies add more parameters and stricter numerical criteria to their Waste Discharge Requirements.

(1) Maintenance Dredging Projects - An example of stricter regulation is the new proposed Waste Discharge Requirement for maintenance dredging in the Deep Water Ship Channels. The new WDR will now require that any dredged sediment material deposited in an upland disposal area meet the average soil contaminants for the State of California. Unfortunately, the US Army Corps of Engineer's historical data indicates that certain contaminants in the background river sediments do exceed the average soil contaminants for California. This means an environmental and human risk assessment must be performed before this material can be moved to an area where human contact or environmental impact is likely.

Last year's sediment and effluent testing also showed that some ammonia toxicity existed when the acute bioassays were performed. It was later discovered that a broken wastewater located pipe upstream of the disposal site near the City of Stockton caused this toxicity. The Regional Water Quality Control Board has thanked the District in bringing this to their attention so that corrective action can be taken. This indicates that the current program of monitoring water quality data is vital in California to protect water quality.

The State regulatory agency is now requiring better determinations of mixing zones and dilution credits related to dredging projects. This becomes complex in an estuarial area where the Sacramento and Stockton Deep Water Ship Channels are located. The problem becomes even more complex when the tidal waters are sluggish. District personnel are taking steps to become more knowledgeable in dye studies and in the methods that mixing zones are determined and dilution credits are given.

To ease data management of a huge amount of water quality data, District intends to upload its historical data on sediment test results, modified elutriate test results, and bioassay results into easily read electronic format. Any new data on future potential dredging projects can then be

compared to the existing data and serve as a basis for consideration by the regulatory agency in determining water quality impacts. Having the historic data easily accessible may also reduce the number of samples, which need to be collected in the future and thus reduce costs. Planning is now underway to post all historical sediment data on the US Army Corps of Engineers WebPages in 2001 next to this water quality report. Due to scanners and new computer programs that can convert data into .pdf files, this can now be easily done.

(2) NPDES Permits - Another example of stricter regulations involve the general NPDES permit for stormwater pollution protection on construction projects. The permit is being revised to add a monitoring program to determine the effectiveness of the Best Management Practices that are installed on construction sites near an impaired body of water. The District's water quality engineer will be involved to ensure compliance with the new permit requirements.

(3) Total Maximum Daily Loads (TMDL's) is one of the most important regulatory program under development today, and this will affect Corps of Engineer's activities in several ways: (1) The District will be affected during dredging and upland confined disposal facility effluent return to a non-attainment receiving water in a TMDL area. Here all allowable waste loadings will have been allocated to other entities within the watershed; (2) Another way is when TMDL development counts on the waters released from District lakes to serve as dilution waters for mass waste loads generated in the watersheds. The authority for this program comes from Section 303(d) of the Clean Water Act. Basically, the purpose of the program is to have those waste sources in any watershed where criteria in the receiving streams are not achieved reduce their waste outputs until the receiving waters achieve criteria. This is done for each individual pollutant that does not achieve criteria. If criteria is not occurring then there will be no mixing

zones allowed for waste inputs. No dilution credits will be allowed for the inflowing waste stream. No waste streams can be added if they themselves do not meet the receiving water criteria. There are several TMDL non-attainment parameters in the Sacramento-San Joaquin Valleys where 10 Sacramento District lakes are, and in the North Coast Valleys where two San Francisco District lakes are. These TMDL's are listed below:

Sacramento-San Joaquin Valley TMDL's:

- Mercury
- Salinity
- Selenium
- Diazinon
- Metals
- Dissolved Oxygen
- Sediment
- Ammonia
- Boron
- Chlorpyrifos
- Organophosphorus Pesticides
- Unidentified Toxics

North Coast Valley TMDL's

- Sediment TMDL (Russian River)
- Sediment and Water Temperature TMDL (Eel River)

NOTE: Only those TMDL's in the North Coast Valley that relate to Lake Sonoma and Lake Mendocino are presented here.

To address this problem District personnel should become knowledgeable of the TMDL activities occurring in the areas of their projects, and relate how waste loads associated with their projects will be accounted for when allowable waste loads are allocated to different entities within each watershed.

(4) Mixing Zone and Dilution Credits - Mixing Zones and dilution credits are going to grow in importance in the NPDES and WDR permits program, and relate to dredging activities and

river construction projects. The dilution credit accounts for the receiving water entrained into the discharge. This value is used in the calculation of effluent limitations. These dilution credits will be limited on a pollutant-by-pollutant basis. For example, if a discharge pollutant is entering a receiving water where that pollutant already is at or above criteria, no dilution credit will be given. But a dilution credit may be given to all the other parameters in the effluent. Also, a dilution credit may be given for a discharge into higher flows, but not given for discharge into lower flows. Whether the receiving water provides complete or incomplete mixing must also be determined. If it is thought that incomplete mixing may be occurring, the Discharger may have to conduct a mixing zone study and demonstrate that a dilution credit is appropriate. Dye studies or in-stream monitoring can do such determinations. If a mixing zone and dilution credit is allowed, the permit shall specify the method by which the mixing zone was derived and the dilution credit given. To address this problem District personnel are going to have to determine the hydrology and turbulence of the water body they are working in, learn how to conduct dye studies, and learn how the degree of mixing is determined and how dilution credits are assigned.

S. Opportunities Identified And How Addressed:

An opportunity for marketing the services of the Corps exists in the potential Mexico work. Mexico would gain the benefits that could be provided by the Corps Waterways Experiment Station and hand-picked District teams, and the Corps would gain additional skills on water quality techniques applicable to different environmental situations.

The Stakeholder Committee on the San Joaquin River Total Maximum Daily Load (TMDL) on Dissolved Oxygen will likely involve the District very shortly. This involves attempts by a Stakeholder group to correct dissolved oxygen depressions along the Stockton Deep Water Ship Channel. The Stakeholder group, consisting of federal, state, and local agencies, feels that

the deepening of the ship channel over the years by the Corps of Engineers is one of the contributors to the dissolved oxygen depression. Math modeling is being done to see what percentage of the problem can be assigned to the various contributors to the problem. This is a high-profile committee and its activities are increasing in intensity. Details of this Stakeholder effort may be obtained from kjwolf@dcn.davis.ca.us. Eventually all of the involved agencies are going to have to comment and agree on the results of the math model, and all will be asked to contribute something toward the final solution required. The percent of each agencies contribution will be as determined by the math model.

The District is checking with other agencies as to whether data sharing can be accomplished between the District Lake water quality activities and the TMDL and Watershed Management Initiatives of those agencies. The District is also cooperating with other agencies regarding the beneficial uses of dredged material in the Delta.

T. Innovative Techniques Utilized to Improve Water Quality – One innovative water quality technique is currently utilized by the District: Sixteen jet aeration nozzles mounted on two underwater manifolds are continuing to be utilized to input 300 pounds per day of dissolved oxygen into the San Joaquin River at the Port of Stockton during the Fall salmon run. The San Joaquin River Dissolved Oxygen TMDL Stakeholders Committee is reviewing the efficiency and practicality of this process.

U. Action Items for the Lake Monitoring Program for 2001.

- (1) Feedback from the Park Rangers will be requested to determine if there is any site-specific water quality issue that should be addressed in future Lake Monitoring Reports.
- (2) The Sampling and Analysis Plans for Lake Water Quality Monitoring and for Maintenance Dredging needs to be developed by the District. These plans will each contain a Field Sampling Plan and a Laboratory Quality Assurance Project Plan. The Data Quality Objectives (DQO) techniques will be used in the development of the plans. The Laboratory Quality Assurance Project Plan will address the need for field blind duplicates.
- (3) Fish tissue analyses will expand for several lakes, to check for mercury content.
- (4) MTBE monitoring will also expand for several lakes.
- (5) The source of mercury input into Black Butte Lake will be investigated. This may require a watershed study. The District will write an action plan for mercury surveillance in fish tissue for Black Butte and have it reviewed by the State Office of Environmental Health Hazard Assessment (OEHHA)

II. Projects in the Planning, Design, and Construction Phases

A. Lake Tahoe - The Tahoe Basin straddles the California and Nevada state line, about 85 miles northeast of Sacramento, California and 15 miles west of Carson City, Nevada. The Basin encompasses over 500 square miles and is comprised of Lake Tahoe and its 63 tributary watersheds. The Tahoe Basin ecosystem has been degraded by past and current human activities such as logging, grazing, stream channelization, road construction, recreational use, and urban development. The exceptional water clarity of Lake Tahoe is decreasing at a rate of about 1 foot per year due to accelerated inputs of nutrient and sediments. Other water resources and related problems in the Basin include lakeshore erosion, flooding along developed stream channels and lakeshore areas, aging wastewater infrastructure (threatening stream and lake water quality), and lack of public recreational access to the Lake Tahoe shoreline.

In June 1997, three multi-agency workshops were held in the Tahoe Basin focusing attention on water resources, transportation, forest health, and recreation and economic development problems and opportunities within the Basin. The Corps and Environmental Protection Agency (EPA) co hosted one workshop, which focused on water quality and other water resource issues. The three workshops culminated in a highly successful visit by the President and Vice-President in July 1997. A key output of the Presidential visit was Executive Order 13057 which directed the EPA, and the Departments of Agriculture, Interior, Transportation, and Army to establish a Lake Tahoe Federal Interagency Partnership. The purpose of the Partnership is to ensure that Federal actions are coordinated and protect the extraordinary natural, recreational, and ecological resources in the Lake Tahoe Basin and the economies that depend on them. Challenges to effective Corps participation in resolving the major resource problems in the Tahoe Basin include:

1. Resolution of Highly Complex Regional Issues - Effectively resolving the environmental problems in the Tahoe Basin involve addressing numerous highly complex physical, economic, social, and institutional issues. The physical problems and potential solutions related to deteriorating stream and lake water quality and fish and wildlife habitat are highly interrelated with regional development and other area socioeconomic and political issues. Successfully addressing the problems will require close coordination with numerous and diverse Federal, State, regional, and local agencies.

2. Application of the Corps Study Process - The traditional Corps Civil Works project process is difficult to implement in the Tahoe Basin. The resources problems are scattered among the numerous sub-watersheds and often involve different non-Federal local interests. In the Corp's general investigation process, a logical next step would be a broad basin-wide investigation that could develop into a Federal project sometime in the future. This model is likely not implementable in the Tahoe area because of the numerous sub-watersheds and diverse non-Federal interests. The District is working with local agencies in the Upper Truckee River watershed to develop a process where potential site-specific restoration projects can be identified and implemented concurrent with conducting a longer-term comprehensive watershed feasibility study.

B. Napa River Flood Control Project - As a result of the Napa River Community Coalition Group the District changed its design to include a set-back levee downstream of the city of Napa. This involves the relocation of 6,000 feet of railroad track. The existing track and surrounding area was inspected to determine whether there were any hazardous and toxic waste sites that might impair water quality. Also, the Waterways Experimental Station finished their water quality modeling work, using the Corps model CE-QUAL-W2. The current emphasis at Napa River

Flood Control Project is the cleanup of HTRW contamination and stormwater pollution prevention during construction.

C. Bank Protection Projects Along the Sacramento and Feather Rivers - Bank protection work is being done at eight sites along the Sacramento River. Water Quality studies are being done to determine if the construction of toe trenches at the bottom of the riverbanks or the placement of imported borrow material into the water will cause impaired water quality. If so, then mitigation methods will be decided on.

D. Stockton Deep Water Ship Channel - The jet aeration system, installed as a mitigative device for the permanent deepening of the Ship Channel, remains in operation to mitigate for dissolved oxygen in the San Joaquin River for the Fall salmon run. Sediment cores and modified elutriate tests have been run in preparation for the next dredging project.

E. Guadalupe River Project, Downtown San Jose - The water quality goal of this flood control project is to re-establish the salmon run up the Guadalupe River through the City of San Jose by providing for colder water temperatures in the stream. A consultant using a spreadsheet model made water temperature predictions. Data was obtained on water temperature, dissolved oxygen, suspended solids, and toxic constituents, and appears in the project's Environmental Report.

F. Brownfield Projects - Work continues by the District's marketing personnel to relate Corps authorized studies, many of which can improve water quality conditions, to the nationwide Brownfield effort to restore slightly contaminated lands in the inner-cities so that industry and jobs will move there. The Salt Lake City Gateway project is such an example. The District has tied its

aquatic restoration project into the Brownfield work there, with the intent to improve water quality in the city creeks, in the stormwater management ponds, and in the Jordan River. The Stockton Brownfield project is another example. Several events are going on in the same area there that can benefit from a coordinated action. The District is planning an aquatic restoration project near Mormon Slough to attract salmon into that area. The District is assisting the EPA in cleaning up an underwater Superfund site in Old Mormon slough that effects water quality. The City of Stockton has a Brownfield project along the river shores adjacent to both the salmon restoration site and the Superfund site. Some coordination has started to ensure that the net result of the actions tends to improve the water quality in the river there.

G. Aquatic Ecosystem Restoration Projects under the Continuing Authority Projects (CAP) 206.

The following projects are ongoing in Sacramento District involving Aquatic Ecosystem restoration. While these projects in the planning stage involve mostly habitat restoration, an issue would occasionally arises which would involve the expertise of the District Water Quality Engineer.

- (1) Cache Creek (Gravel Pit), CA
- (2) City Creek – Salt Lake City, UT
- (3) Clear Lake, CA
- (4) Clover Creek, Redding, CA
- (5) Decker Lake, UT
- (6) Gunnison River, North Fork, CO
- (7) Hennessey Creek, Fairfield CA
- (8) Jordan River, Upper, UT
- (9) Jordan River, West, UT
- (10) Lake Natoma Restoration, CA
- (11) Pacific Flyway, CA
- (12) Penn Mine ecosystem restoration, CA
- (13) Pyramid Mines, NV
- (14) Solder Hollow, NV
- (15) Tahoe Regional Wetland (including Edgewood Creek), CA
- (16) Lower Truckee River, Pyramid Lake, Paiute Tribe, NV
- (17) Upper Truckee River, NV

H. Aquatic Ecosystem Restoration Projects under the Continuing Authority Projects (CAP) 1135.

The following projects are also ongoing in Sacramento District involving Aquatic Ecosystem restoration but under the CAP 1135 program. While these projects in the planning stage also involve mostly habitat restoration, an issue occasionally rises which would involve the expertise of the District Water Quality Engineer.

- (1) Ashley Creek, UT Cherokee Canal, Oroville, CA
- (2) Colusa Basin Wetland Restoration, CA
- (3) Daguerre Point Dam, Maryville, CA
- (4) Feather River, North Fork Chester, CA
- (5) Kings River Fishery, CA
- (6) Mormon Channel, Stockton, CA
- (7) Murphy Slough, CA
- (8) Numana Dam Fish Passage, NV
- (9) Prospect Island, CA
- (10) Putah Creek, South Fork
- (11) Sacramento River, Chico Landing to Red Bluff, CA
- (12) Truckee River, Lower, Washoe, County, NV
- (13) Yolo Basin Wetland, Davis, CA

III. Annual Lake Water Quality Monitoring Program

A. Parameters Being Monitored - The District samples the 12 lakes during the Spring and during the Summer. The Spring monitoring reflects the lake condition after it has received the bulk of the incoming nutrients, organic loads, and other contaminants that may have washed off of the watershed, and before thermal stratification sets in. Some Spring blooms of phytoplankton may already have occurred. The Summer monitoring reflects the lake condition during strong thermal stratification, after most of the organic decay has occurred toward the lake's bottom, and most of the Spring and Summer phytoplankton blooms have occurred. The parameters monitored and the locations are shown in the attached figure.

B. QA/QC Techniques - The District is in the process of incorporating more QA/QC techniques into the annual lake monitoring program, so that the methodology is comparable to the USGS's NAWQS program. This will then allow a multitude of agencies to share their data in the future with a feeling of confidence in support of better 21st Century decisions affecting water quality. QA/QC techniques are built around a Field Sampling Plan and a Quality Assurance Project Plan.

Field Sampling Plan - The U.S. Bureau of Reclamation does the field sampling for the District. In their work they follow several protocols on field sampling, as follows:

(a) USGS Field Guide for Collecting Stream Quality Samples. This consists of a USGS ring binder entitled "Guide for Collection, Treatment, and Analysis of Water Samples, Western Region Field Manual, Sept. 1990.

(b) California DWR, State Water Project Water Quality Field Manual, 1991

(c) USEPA sampling protocols

The District is currently starting work on developing their own field manual which will incorporate the above by references but also take into account special needs of the District's program, such as the phytoplankton sampling program and field calibration techniques.

C. Changes for the Lake Monitoring Report for 2000

For 2000, the following changes occurred in this year's Lake Monitoring Report:

- a. The metal graphs were re-programmed from Quattro-Pro to Excel.
- b. The DO/ph/Temp profile graphs were re-programmed from Quattro-Pro to Excel.
- c. The Algae Count graphs were programmed into Adobe Acrobat format.
- d. Maps were included to identify the location of the sampling sites on the lakes.
- e. MTBE data results are included for the first time.
- f. Fish Tissue analysis results are provided for the first time.
- g. Due to frequently asked questions from the general public concerning MTBE and mercury in fish tissue, the EPA fact sheets on MTBE and mercury are provided.
- h. The entire report will be generated directly in .pdf format to ease uploading of data on the Internet. This will also ease downloading of this same data by anyone on the Internet who desires a printout of the Report. It should be noted that the original laboratory reports and the maps had to be converted indirectly into .pdf files by scanning. Due to potential errors in the scanning process, discussing is now underway for the commercial laboratory to issue their laboratory reports in Adobe Acrobat format for 2001.

D. Lake Annual Water Quality Reports for 2000 - The following lakes have had separate reports written for them. These reports only contain the highlights or summaries of the complete report. The complete report for each lake is available from the District office and contains such additional information as QA/QC results with their Quality Control Summary Reports (QCSR's), complete laboratory analytical data results, and raw field data. They were not put into this summary report so as not to add too much bulk to this document.

1. Black Butte Lake
2. Eastman Lake
3. Englebright Lake
4. Hensley Lake
5. Isabella Lake
6. Kaweah Lake
7. Martis Creek Lake
8. Mendocino Lake
9. New Hogan Lake
10. Pine Flat Lake
11. Sonoma Lake
12. Success Lake

These reports are attached